Commissioner Brighton's Draft Chapter 8A – v11-23-2020

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Chapter 8A: Climate Change and the Tax Structure

Many state, national and global scientific experts have predicted the likely consequences of climate change and suggested approaches to reduce carbon emissions. The commission relied on those forecasts and tried to imagine the corresponding tax implications. First, we looked at predicted effects of climate change that might affect the tax bases and tax revenue, absent interventions. Second, we looked at approaches to mitigate and adapt to climate change that might either affect current tax bases or that might rely on new taxes, changes to existing taxes, or tax credits. We then considered the combined effect of climate change and Vermont's response on the tax structure.

Tax Related Consequences of Climate Change

Briefly, the main immediate climate consequences in Vermont are expected to be: warmer temperatures; longer summers, shorter winters, and unpredictable shoulder seasons; intense and unpredictable weather events; more precipitation in the winter but summer drought. These, in turn, will lead to stress and decline in some native species but increased productivity of some crops and weeds; spread of invasive species, ticks and tick-borne diseases; storm damages to structures, infrastructure, forests, and agriculture. In general, there will be damages to health, homes, forests, infrastructure, agriculture, labor, tourism, and supply chains. Nationally, the effect has been estimated to be a loss of 1% to 3.1% of average GDP by the end of the century.[1] The composition of Vermont's GDP by sector looks similar to that of the nation.

2019 GDP[2]	US		VT
All industry total (million $)	21,427,690		34,785
Agriculture, forestry, fishing and hunting	0.8%		1.2%
Mining, quarrying, and oil and gas extraction	1.5%		0.5%
Utilities	1.6%		1.9%
Construction	4.1%		3.3%
Manufacturing	11.0%		9.3%
Wholesale trade	6.0%		4.9%
Retail trade	5.5%		7.4%
Transportation and warehousing	3.2%		1.7%
Information	5.2%		2.6%

[1] RCP8.5. T. Deryugina, S. M. Hsiang, NBER Working Paper 20750 (NBER, 2014); www.nber.org/papers/w20750

[2] BEA

Finance, insurance, real estate, rental, and leasing	21.0%		19.4%
Professional and business services	12.8%		10.9%
Educational services, health care, and social assistance	8.8%		14.0%
Arts, entertainment, and recreation	1.1%		1.0%
Accommodation and food services	3.1%		5.3%
Other services (except government and government enterprises)	2.1%		2.3%
Government and government enterprises	12.3%		14.3%

However, there are ways in which Vermont's economy is different. The Bureau of Economic Analysis looks at outdoor recreation as a component of GDP—teasing out recreation activities from several of the traditionally tallied categories shown in the table above. In the US as a whole, outdoor recreation accounts for 2% of GDP; in Vermont it accounts for 5.2% of GDP and 4.4% of Vermont's employment.[3] This total includes not just the recreation activity itself, but also associated expenditures.

Although outdoor recreation in all seasons is important to the economy, snow sports account for nearly half of the outdoor recreation value added. A NOAA study projects Vermont will have 25-34 fewer days below freezing per year by 2080. [4] The shorter snow season will be punctuated by more interludes of rain and warmth, severely reducing the snowpack for snowmobiling and back county skiing, and challenging the ability of snowmaking to save the alpine ski season. Because the season is projected to start later, it is less likely that Vermont ski areas will be able to open during the Christmas/New Year's holidays by the second half of the century, even with significant increases in snowmaking.[5]

Agriculture is also more important in Vermont that in the nation as a whole. The market value of products sold in 2017 was estimated to be $780 million. [6] Just as with snow sports, agriculture is part of the Vermont brand and is the foundation of many value-added enterprises, including tourism.

According to the USDA, climate change may affect dairy not only by stressing cows, but also by changes in crop production; changes in feed-grain availability, and price; and disease and pest distributions.[7]

Maple trees will suffer as the Vermont climate changes. One Vermont study concluded "climate projections under a low emissions scenario indicated that by 2071 55% of sugar maple across the state would likely experience moderate to severe climate-driven stress relative to historic baselines,

[3] https://www.bea.gov/news/2020/outdoor-recreation-satellite-account-us-and-states-2019
[4] https://www.climate.gov/sites/default/files/station_locations_lrg_0.png
[5] Climate Change Vulnerability of the US Northeast Winter Recreation - Tourism Sector. 2007. Daniel Scott * Department of Geography, University of Waterloo, Canada Jackie Dawson Department of Geography, University of Waterloo, Canada Brenda Jones Department of Geography, University of Waterloo, Canada

[6] USDA Census of Agriculture www.nass.usda.gov/AgCensus
[7] USDA, Climate Change and Agriculture in the United States: Effects and Adaptation, USDA Technical Bulletin 1935. Washington, DC, 2012, www.usda.gov/oce/climate_change/ effects_2012/effects_agriculture.htm

increasing to 84% under a high emissions scenario."[8] The yield and sugar content of maple sap are projected to drop due to shorter seasons, fewer freezing nights, and stressed trees.[9] And, a shorter and less predictable fall, with a diminishing pop of bright maple leaves, will dim the foliage tourist season.

Apple trees, balsam Christmas trees, and northern hardwood forests as we know them will also be stressed as their preferred climate changes and new pests, diseases, and invasive species gain foothold.

As dire as it may seem, Vermont is expected to be better off than many other parts of the US. For many crops, production is projected to increase in Vermont due to longer growing seasons and CO2 fertilization. In the southern part of the US, on the other hand, production is projected to decrease due to heat and drought.

Vermont is predicted to have a relative advantage in more than just agriculture; one national study projected climate change consequences on agriculture, energy demand, crime, labor and mortality and showed all Vermont counties doing relatively well in comparison to other parts of the country.[10] The study results indicate a "large transfer of value northward and westward."

This may lead to what is perhaps the most significant consequence of climate change on the Vermont economy: in-migration. It is estimated that 40% of US residents live in coastal areas, which are most likely to experience flooding and hurricane damage. In neighboring Massachusetts alone, 62,069 homes are at risk of being underwater if sea levels rise by 6 feet. [11] Cities, which have concentrations of industry as well as residents, are also projected to be hotter and to have higher levels of air pollution than rural areas. Although several studies have located the houses and businesses at risk and the potential for out-migration, few have attempted to give more shape to where the migrants will go except: inland and north.

Obviously, the effects of climate change will be far ranging and substantial. However, they do not necessarily indicate a change in Vermont's tax structure. While some enterprises may decline, others, such as renewable energy, information, and construction are likely to grow--especially after considering Vermont's advantage relative to other parts of the country. While there may be reductions in property values due to storm damages and perceived risk as well as decreased demand for slope-side condominiums, reconstruction and in-migration may add new development to the property tax rolls.

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[8]The complex relationship between climate and sugar maple health: Climate change implications in Vermont for a key northern hardwood species. 2018. https://epscor.w3.uvm.edu/2/biblio?f%5Bauthor%5D=2498

[9] https://www.uvm.edu/femc/attachments/project/999/annualMeeting/2017/presentations/Rapp_FEMC_ImpactsOfClimateChangeOnMapleSyrupProduction_121417.pdf

[10] Hsiang, S., Kopp, R.E., Jina, A., Rising, J., Delgado M., Mohan, S., Rasmussen, D.J., Muir-Wood, R., Wilson, P., Oppenheimer, M., Larsen, K., and Houser, T. (2017). Estimating economic damage from climate change in the United States. *Science.* doi:10.1126/science.aal4369

[11] Rao, Krishna. 2017, June 2. "Climate Change and Housing: Will a Rising Tide Sink All Homes?" Zillow Research.

Consumption taxes will need ongoing revision as new services are developed to deal with changes and as consumers spend more on services and less on goods. The rooms and meals tax is likely tax to suffer disproportionately, although it is also possible that Vermont will provide a welcome escape from the hot cities, offsetting some of the loss of winter tourism.

Tax-Related Efforts to Reduce Carbon Emissions and Adapt to Consequences

The Legislature has looked at both pricing and non-pricing options for reducing climate emissions, and recently commissioned a decarbonization study to provide objective estimates to help craft the state's response.[12] Pricing options generally involve carbon taxes, or cap-and-trade programs that would increase the price of emitting carbon. Non-pricing approaches include things like incentives to purchase electric vehicles, investments in public transportation, and regulations or performance standards . For Vermont to reach its emission goals, both pricing and non-pricing initiatives are being developed.

The pricing approaches tend to be more comprehensive and more cost effective. The main difference between the types of pricing options is that a climate tax sets a price for carbon, but not the emission level that results. A cap and trade approach, on the other hand, sets the emission level allowed, but not the price. In addition, carbon taxes tend to apply to all carbon emissions while cap-and-trade programs tend to apply to only certain sectors such as electricity or transportation. As with taxes in general, the broader the base, the more effective and less distortionary it can be, at a lower rate.

Both pricing approaches result in revenue to the state, which can be distributed to make investments to further the goal of carbon reduction, to reduce the cost of electricity, to reduce taxes, and/or to make payments to households to help offset the cost increases due to the carbon pricing. Some of the options to return this revenue to the economy are tax related: tax credits, tax exemptions, and reductions in tax rates.

To achieve reasonably similar reductions in carbon, either approach would result in a slight reduction in GDP, which could be offset to different degrees by different uses of the resulting state revenue and non-pricing activities. A reduction in the GDP would mean a reduction in tax revenue, in addition to the reduction in gas tax revenue. However, when accounting for the environmental and health benefits, all options considered by the decarbonization study commissioned by the legislature would result in net benefits.

At the current time, Vermont is participating the in the Regional Greenhouse Gas Initiative (RGGI) that covers electricity generation, and is considering joining the Transportation Climate Initiative (TCI), a regional cap-and-trade program that covers carbon emissions in the transportation sector. While regional cap-and-trade programs increase fuel prices, they do so for all participating states. In contrast, a Vermont carbon tax on the same sectors would cause the loss of revenue to neighboring states and the perception of Vermont having higher taxes.

[12] An Analysis of Decarbonization Methods in Vermont. 2019. Marc A.C. Hafstead, Wesley Look, Amelia Keyes, Joshua Linn, Dallas Burtraw, Roberton C. Williams III

Pricing approaches are likely to be less successful in reducing emissions in Vermont than they would be in other areas in the country because a high proportion of our emissions come from activities that are necessary, and therefore less likely to be reduced if the price is increased. About 43% of Vermont's emissions come from transportation while only 28% of the emissions in the US do. Similarly, 24% of Vermont's emissions come from heating, while only 10% of the emission in the US do.[13] Reducing the use in these sectors is difficult unless there are viable alternatives to meeting the need. For this reason, non-pricing approaches that provide economically feasible alternatives are needed, even though in isolation they may be less cost effective than pricing approaches.

Both the Vermont Energy Action Network (EAN) and the Vermont Climate Action Commission (VCAC) have recommended numerous non-pricing actions to reduce emissions, generate energy from renewable sources, and sequester carbon. Many recommendations would provide incentives to help Vermont families transition off fossil fuels. Some of these do not require public funds. The electric utilities can provide financing for some of the investments needed by households and businesses to switch from fossil fuels to electricity.[14] This type of investment would meet the Tier 3 requirements of Vermont's Renewable Energy Standard while also increasing electricity sales. But other incentives recommended to be expanded, such as the Electric Vehicle purchase incentive and the Clean Energy Development Fund incentives, would be publicly supported. In addition, because transition investments are difficult, if not impossible, for lower income households, public funding is recommended for expanding loan programs and doubling the Weatherization Assistance Program.

Many recommended initiatives are state infrastructure projects, requiring public funding. These include state aid for school biomass projects, and expanding public transit and rail infrastructure.

While most climate change programs often focus on reduction of emissions and/or renewable generation, the VCAC notes that sequestration is also important and frequently overlooked. They recommend investments to conserve forest land not only for sequestration, but also for flood protection which is increasingly important in weathering the intense storms in the changing climate. This may be looked at as preventing emissions, as the report states: "Every acre of forest lost to development has the potential to release a hundred metric tons of carbon dioxide equivalent into the atmosphere – like adding 25 cars for a year."[15]

The most obvious effects of Vermont's responses to climate change are likely to be a reduction in the fuel-dependents sectors of the economy, an increase in the electricity and green energy sectors, a slight reduction in the GDP from pricing which may be offset by growth induced by the non-pricing actions, a reduction in the gas tax revenue, and the need for more funding for transition initiatives.

In Combination

[13] This estimate comes from An Analysis of Decarbonization Methods in Vermont. P.14. According to Vermont's Energy Action Network, 28% of Vermont's emissions come from heating. https://www.vtenergydashboard.org/uploads/slideshow/EAN-report-2018-highres-compressed.pdf

[14] Vermont Climate Action Commission. 2018. http://anr.vermont.gov/about_us/special-topics/vermont-climate-action- commission

[15] VCAC Final Report. P.55

The commission appreciates the efforts being made in mitigating and adapting to climate change. Our scope is only to consider the tax implications, and to align them with the principles adopted by the commission. We are looking only at a short-term forecast of a transition period; our assumption is that investments made during this transition period will protect the state and strengthen the economy over the long term. As such, we offer a few observations.

In combination, climate change and programs to address it, are likely to decrease GSP slightly during the transition period, and therefore reduce revenue from current taxes at current rates. The greatest hits will probably be in the Gas Tax and the Rooms and Meals tax.

Because lower income households pay a higher percentage of their incomes in fuel, any increase in fuel prices is likely to be regressive. Whether the pricing mechanism is called a tax or not, the commission recommends returning enough of the resulting revenue to households to offset the regressivity.

The commission supports the use of tax credits and exemptions to reduce the upfront cost of some investments that will make the transition possible, even though in general the commission strives to keep the tax base as broad as possible. But it is important to also enable citizens who can't afford to make an investment at all to transition off fossil fuels. Combining an upfront incentive with a loan that can be paid off through savings in a short period of time may be helpful, although outside of the tax code.

In comparison with a Vermont-only pricing program, regional partnerships have the benefits of retaining the state's actual and perceived competitivity in the region and reducing the incentive to buy fuel or conduct business over state lines. The commission agrees that the tax structure should be responsive to interstate competition.

If the pricing mechanisms are successful, carbon emissions will drop each year, and the pricing will need recalibration to continue the progress. In this process, using the revenue from carbon pricing to replace other taxes (such as lowering the income tax rate in the lowest bracket) could destabilize the tax structure. Instead, we recommend that returns to the economy from the pricing mechanism be made in transitional payments and investments that help offset the costs of the transition. Once we reach steady state, the tax structure could be rebalanced.

While in-migration could benefit the economy and boost tax revenues, it is not clear how it would be accommodated. Much of our infrastructure is inadequate to support growth in village centers, and many of our village centers are near rivers. At the same time, we have a goal of keeping our forests intact, for multiple ecosystem benefits as well as for carbon sequestration and flood resiliency. Vermont's response to rapid development in the 1980's included the Land Gains Tax and the Use Value Appraisal Program. Although these taxes are still in place, it is not clear to the commission that we have the right tools to direct potential development at this point in time.

The Vermont Climate Action Commission report puts it this way: "Demographic change, greenhouse gas emissions, severe weather, and financial challenges prompt a fresh look at Vermont's smart growth

strategies and land use governance as means to address climate change." We agree. And we recommend that the fresh look include role of taxes in the mix.

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